Lorna Glen Introduced Predator Monitoring

Pre-bait survey

28 June – 2 July 2012

Neil Burrows and Graeme Liddelow
Department of Environment & Conservation
July 2012

Summary

- Cat population and activity has increased three-fold since the last aerial baiting operation in 2011 with the TDI increasing from 4.8 to 14.7. This represents the highest level of cat activity since the pre-baiting assessment in winter 2004. There is an estimated 26 individual cats recorded on a total of 100 km of sample transect.
- While still low, dog activity has increased slightly since the last baiting, probably for the same reasons as the cat increase. There is an estimated 10 individual dogs recorded on the 100 km of sample transect.
- The Edge Trap Bait Digital Callers (Edge Callers) were again very successful, attracting cats into the active sample stations.
- Bait uptake by cats that visited a station was 51% which is an encouraging sign for baiting success in the coming days.
- Most cats were characterised as 'medium' size, with a few small and a few large cats.
- Mulgara activity has increased significantly, with mulgara tracks being recorded on all transects and in all landsystems.
- As to be expected at this time of year, reptile activity was very low but birds were attracted to the stations.
- The very high prey availability due largely to the abundance of mulgara may decrease bait uptake and baiting efficacy of aerial baiting scheduled for 4-5 July.
- Post-bait assessment will be completed by early August and a comprehensive report prepared by end of August.

Recommendations

- Now that the predator surveys have been reduced from 4 x per annum to 2 x per annum (before and after baiting), the resources saved should be re-directed to intensive post-bait cat control especially since the cat population has the potential to increase rapidly on the back of a good season and abundant food.
- This should include intensive mop-up trapping using the Edge callers and leg hold traps following the post-bait survey and either opportunistic or systematic ground baiting through to mid-September. The priority for mop-up of cats should be a) around the compound, b) in the vicinity of the bandicoot reintroductions and c) in the vicinity of known bilby populations (see horse survey report).
- It would be very informative to run a survey on Earaheedy, which is unbaited, to assess a) cat and dog densities and b) mulgara density. This would assist with determining the contribution of seasonal (rainfall) effect and cat control on mulgara density.
- Catch and fit radio collars to at least 5 cats and 5 dogs prior to the 2013 aerial baiting to a) better understand their activity and seasonal movement patterns, b) the level of contact / avoidance, temporal and spatial interaction between dogs and cats, and c) baiting efficacy to complement the indirect track count measures. It will help answer the questions: Are we turning cats and dogs over? What proportion of the cat / dog population is not taking the baits? What is the level of reinvasion?
- Better communication and integration between the introduced predator control program and the fauna reintroduction program. In order to improve survivability in the first few months after a reintroduction, it may be beneficial to carry out reintroductions soon after aerial baiting and mop-up and to specifically target the proposed reintroduction sites for intensive cat control.
- Continue trialing Edge callers with the large cage traps to catch cats.

Summary of data and notes – Pre-bait survey 28 June - 2 July 2012

Table 1: Summary of track activity (TAI) for cats & dogs only. TAI for 10 Transects (each 10 km except T4 = 9km) over five days = (Total individual tracks X 100) /495)

Transect	Day 1		Day 2		Day 3		Day 4		Day 5		Totals	
	Cat	Dog	Cat	Dog	Cat	Dog	Cat	Dog	Cat	Dog	Cat	Dog
1	1	0	1	1	1	1	2	0	1	0	6	2
2	2	0	2	0	1	0	1	1	1	0	7	1
3	1	0	1	1	2	1	1	0	1	0	6	2
4	1	1	1	1	1	1	1		2		6	3
5	0	0	2	0	0	0	0	0	2	0	4	0
6	2	0	2	0	2	1	3	0	1	0	10	1
7	3	0	2	0	3	0	2	0	2	0	12	0
8	2	2	2	0	2	0	2	0	1	0	9	2
9	0	0	1	0	1	0	2	1	2	1	6	2
10	2	1	0	0	2	1	1	0	2	0	7	2
Total tracks	14	4	14	3	15	5	15	2	15	1	71	15
TAI	**14.1**	**4.0**	**14.1**	**3.0**	**14.1**	**5.0**	**15.1**	**2.5**	**15.1**	**1.0**		
										Mean TAI	**14.7**	**3.0**

Notes Table 1 (above): Trends in Track Activity Index (TAI)

- Cat activity has increased more than three-fold since the last assessment in January 2012, with the TDI increasing from 4.7 to 14.7. This is probably due to the above average rainfall over the last 18 months and consequent successful cat breeding since the last baiting session in winter 2011.
- Most cat footprints were of small-medium size cats with a few quite small cats and a few quite large cats. This suggests a significant recruitment cohort from the spring 2011 breeding season (small to medium prints) and the possibility of a limited autumn 2012 breeding season (small prints).
- At next assessment and thereafter, gait and footprint spread will be measured as an index of cat size class distribution.
- Cat activity occurred across all transects with highest activity on T6 and T7 (Bullimore) and lowest activity on T5 (Bullimore) and T1 (non-Bullimore).
- Dog activity, while very low, has increased from 1.8 to 3.0 over the same period.
- There are an estimated 26 individual cats and 10 dogs on the 100 km of transect lines.
- The position of each cat and dog intersected on transects was recorded on a GPS. This will be repeated post-baiting to see which animals survived the baiting. GPS locations of the survivors will assist mop-up activities.
- To make them readable and to improve efficiency, Transects 6 and 10 were moved (see attached map). All 10 transects were read for prints, although only 9 km were read on Transect 4. Parts of Transect 4 will be relocated next assessment to make it readable.

- Of the 100 km of transect, 53 km is Bullimore landsystem (spinifex sand plain / dune fields) and the remainder is various non-Bullimore, being representative of landsystem composition of Lorna Glen.

Trend in cat density

Figure 1 shows the trend in cat density (based on activity - TDI) at Lorna Glen since 2003. Notable features are:

- Significant reduction following the initial baiting in 2003.
- Sustained reduction of the TDI (mostly <10) as a result of annual aerial baiting.
- Modal trend associated with activity increase between baiting events.
- Inability to eradicate cats, therefore the potential for a relatively rapid increase following good seasons (e.g. 2011 / 2012).

Figure 1: Mean seasonal Cat Track Density Index (TDI) for Lorna Glen from 2003. Baiting commenced Winter 2003 (data pre 2010 modified from Algar et al. in press)

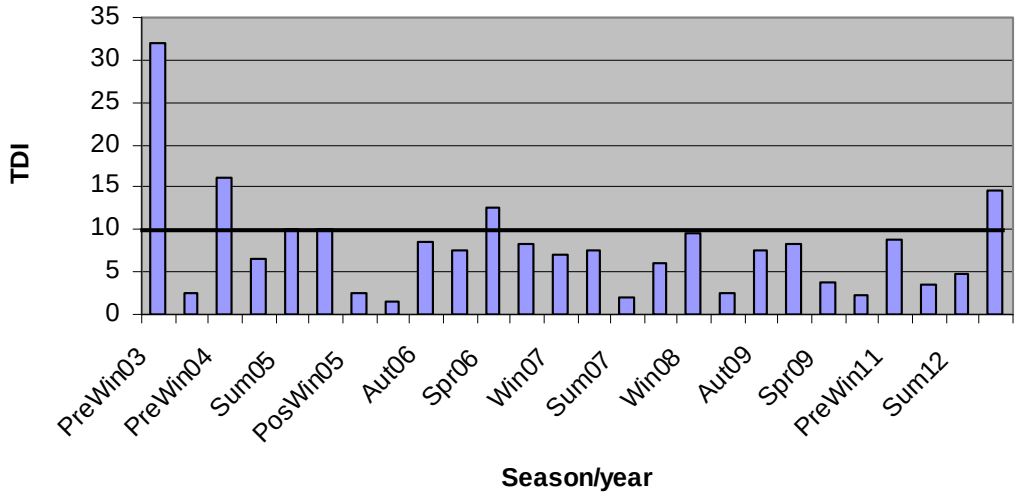


Table 2: Estimated number of individual cats and dogs encountered on 99 km of transects. Individual Density Index (IDI) = (No. individuals X 100) / 99)

Transect	Individual Cats	Individual Dogs
1	2	1
2	2	1
3	3	1
4	2	2
5	2	0
6	3	1
7	3	0
8	3	2
9	2	1
10	3	1
Total individual animals	26	10
Mean IDI	**26.2 cats / 100 km**	**10.1 dogs / 100 km**

Notes Table 2 (above): Individual Density Index (IDI)

- Since January 2012 the Cat IDI, or the estimated cat population, has more than doubled from 11.4 cats / 100 km to 26.2 cats / 100 km. The Dog population, while low, has also doubled from 5.0 dogs / 100 km to 10.1 dogs / 100 km.
- While dog numbers are up on the last counts, they are still in low numbers across the property.

The track and bait station inspection technique is providing valuable information about the distribution and abundance of other animals such as mulgara. Mulgara activity continues to increase exponentially (Figure 3). As with previous assessments, signs of mulgara (footprints) are found across almost all landsystems, although they are most abundant on the Bullimore landsystem. Based on footprint size, the population comprises a good mix of young (small footprint) and old (large footprint) individuals.

The explosion of mulgara is likely a combination of good recent seasons (rainfall) and cat control. To better understand this interaction, it would be very informative to run an assessment of some 50 km in an area that has not been baited, such as Earaheedy.

Consistent with the 'boom and bust' existence of wildlife in the arid zone, it will be important to track and interpret the probable collapse of the mulgara population over the coming years.

Setting out cameras to help identify the plethora of bird, reptile and other small mammal footprints that are observed on the active sample stations would add value to the introduced predator surveys and compliment the BioMonitoring data. If existing DEC cameras are available for the post-bait session at the end of July and thereafter, they will be utilized. Otherwise, we will consider purchasing cameras specifically for introduced predator and associated work.

Figure 3: Mulgara track activity at active stations

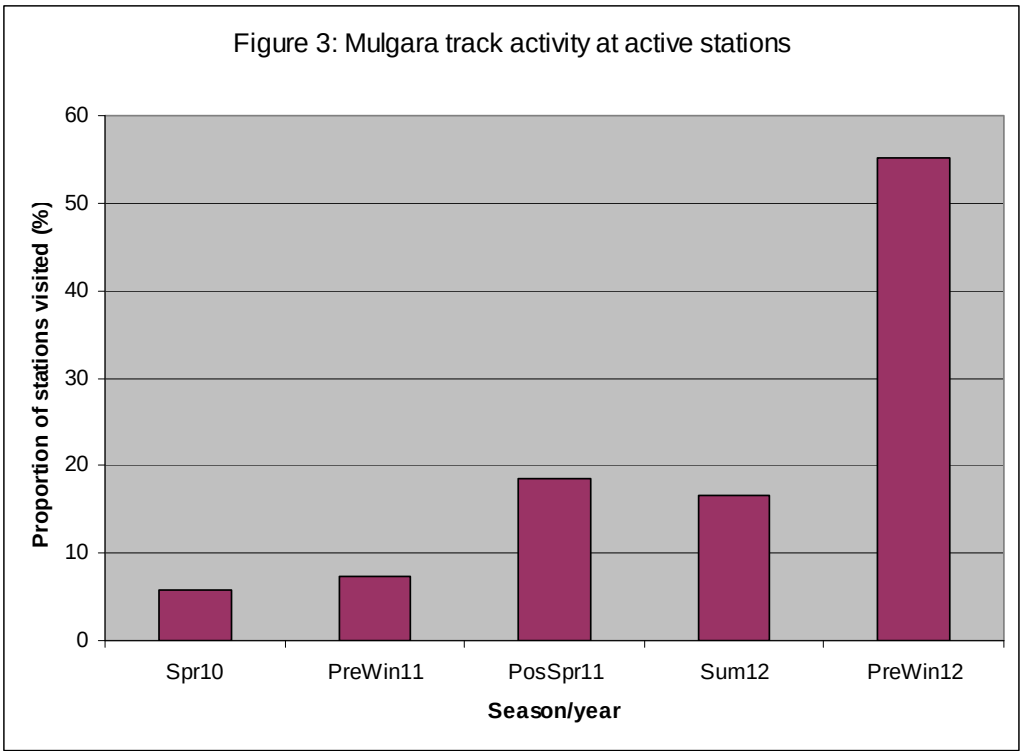
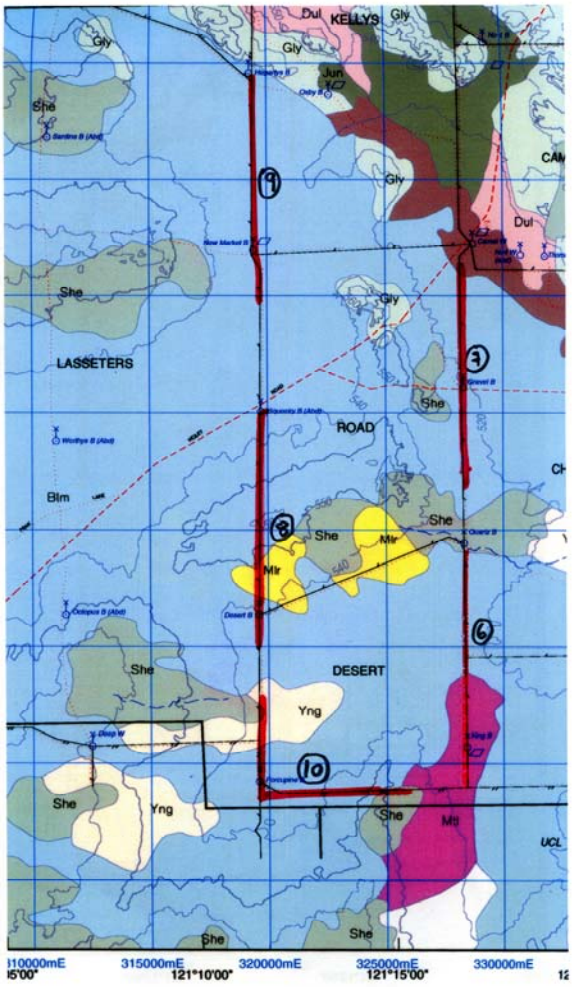


Table 3: Summary of activity on active sample stations (Edge callers, non-toxic baits (NTB) & sand pads).

Transect	Totals over 5 days			
	Nil activity (% of stations)	**Pass (% of stations)**	**Visit (% of stations)**	**Bait take (NTB) (% of stations)**
1 (n=50)	6%	Dog - 2%	Cat – 2% Bird – 8% Mulgara – 8% Ants – 6%	Mulgara – 60% Bird – 6% Bird or Mulgara – 4%
2 (n=50)	18%	Bird – 2%	Cat – 2% Bird – 10% Mulgara – 2% Ants – 2%	Cat – 2% Mulgara – 38% Bird –14% Bird or Mulgara – 10%
3 (n=50)	0%	0%	Cat – 2% Bird – 2% Bird and Mulgara – 4%	Mulgara – 90% Bird – 2%
4 (n=50)	28%	Cat – 4% Dog – 2%	Cat – 4% Bird – 28% Bird & Mulgara – 10% Bird & Ant – 8% Ant – 4%	Cat – 4% Bird – 6% Mulgara – 2%
5 (n=50)	16%	Cat – 2%	Bird – 20% Mulgara – 4%	Cat – 6% Mulgara – 52%
6 (n=50)	16%	0%	Cat – 4% Bird – 6% Ant - 8% Bird & Ant – 2%	Cat -2% Mulgara – 44% Bird – 6% Dog or Mulgara – 8% Bird or Mulgara – 4%
7 (n=50)	8%	Cat – 2%	Cat – 14% Bird – 4%	Cat – 14% Mulgara – 48% Bird – 4% Mulgara or Bird – 6%
8 (n=50)	16%	0%	Cat – 2% Mulgara -6% Bird – 12% Ants – 6% Ant & Bird – 4% Bird & Mulgara – 6%	Cat – 8% Mulgara – 26% Bird – 6% Bird or Mulgara – 8%
9 (n=50)	8%	Cat – 2% Dog – 2%	Cat – 4% Bird – 10% Mulgara – 2%	Cat – 2% Mulgara – 46% Bird – 10% Bird or Mulgara – 16%
10 (n=50)	16%	0%	Cat – 4% Bird – 8% Mulgara – 2% Mulgara & Bird – 2% Ants and Bird – 2%	Cat – 2% Mulgara – 52% Bird – 10% Bird or Mulgara – 2%
Total (n=500)	**14.2%**	**1.8%** Cat – 1.0% Dog- 0.6% Bird – 0.2	**23.7%** Cat – 3.8% Dog – 0.3% Bird – 11.4%; Mulgara – 3.4%; Ants – 1.6% Mulgara & Bird – 1.2% Ant & Bird – 1.6%	**60.3%** Cat – 3.6% Mulgara – 44.8% Bird – 6.4% Mulgara or Bird 5.0% Mulgara or Dog – 0.8%

Notes Table 3 – Active sample stations

- The new Edge Trap Bait Digital Callers work very well, attracting cats (and other animals) into the bait stations. Historically, and across seasons, about 65% of bait stations recorded no activity, but since we have been using the new Edge callers, this fell to 43% last survey (January 2012), and this survey, only 14% of stations recorded no activity.
- Of the 48 instances when a cat was recorded in the vicinity of a bait station, there were only 5 (10%) instances when it walked past the station without showing interest. In 21 instances the cat visited the bait station and in 22 instances (51%), the cat removed the bait.
- A total of 309 non-toxic baits were removed (replaced), the highest level of bait removal since the commencement of monitoring in 2003. Of these, mulgara removed at least 70%, and possibly more. Where there was multiple species activity at a station it was difficult to know which species took the bait.
- Mulgara activity has increased significantly, with mulgara footprints being recorded on all transects, on 84 of the 100 active sample stations and in all landsystems, although they were most abundant in the Bullimore landsystem.
- There was a very low incidence of ant attack on baits, as to be expected at this time of year.
- The Edge Callers attract birds, so in conjunction with cameras, it may be a useful technique for monitoring bird populations, at least of those species that are attracted to the callers, including raptors and owls.



Location of new Transects 6 & 10 – Western circuit.

Appendix
Explanatory notes - estimating introduced predator density

Feral cats, and to a lesser extent, wild dogs, are rarely seen and their populations are difficult to determine using trapping or spotlighting techniques. Therefore, indirect measures are used to estimate relative abundance. We use two measures, which rely on skilled observers and some sampling rule sets.

1. The Track Activity Index (TAI), which is calculated from the total number of sets of tracks (footprint sets) recorded over 5 nights for the 10 dragged transects each 10 km long. Algar and Burrows provide a rule set for determining whether a set of discontinuous track sets detected on a transect on the same day is counted as one or more track sets. In essence, if cat tracks are the same size, going in the same direction and are less than 2 km apart, we assume it is the same animal. The TAI is the measure currently used to set thresholds for free range fauna re-introductions (TAI<10.0).

TAI = (total number of track sets counted over 5 nights X 100) / 500).

Where cats have not been controlled in the arid zone, the TAI is usually 25-35. It can be as high as 55-65 in regions such as Shark Bay that sustains very high rabbit populations.

2. The Individual Density Index (IDI): This is calculated from the estimated number of individual animals (cats or dogs) detected by footprints along the dragged transects over 5 nights. That is, after 5 nights, we examine the data and estimate how many individual animals we think there are along the 100 km (10 transects x 10 km) of dragged transects and express this as a number per 100 km. This is estimated based on the size of the cat (or dog) and where along the transect it is detected each night. The IDI is calculated by:

IDI = (No. of individuals X 100) / 100.

The IDI is less reliable than the TDI because it requires somewhat subjective (expert) judgments and assumptions to be made about the actual number of individual animals on the transects over 5 nights.

To compare the TAI and the IDI, consider the following example:

After 5 nights of surveying a 10 km transect, we record one cat track set each night, so the TAI = (5 x 100) / 50 = 10.0. However, because of the size and location of the tracks, we conclude that the tracks have been made by 2 individual cats, so the IDI = (2 x 100) / 10 = 20.0. If we concluded that the tracks were made by 3 cats, then the IDI = (3 x 100) / 10 = 30.0, etc.